In Cigital for Diwali Engineering Team conducted a game.In this game they given a 2D rectangular grid, there are multiple sources and multiple destinations.You can select any one of the source and reach any one of the selected destination but the path sum should be minimum as possible. Such that you can select source and destination. All programmers in cigital are trying to find efficient algorithm to solve problem, Cigital welcomes you to solve the problem.
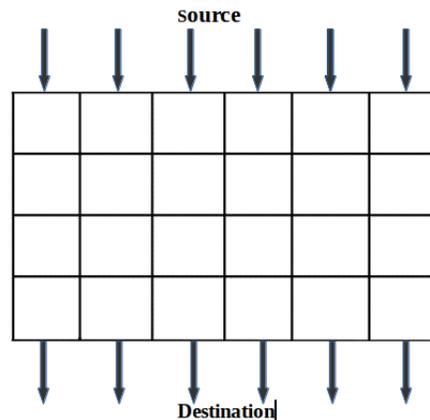
Given the 2D rectangular grid where you have to travel from source to destination with minimum cost. You can select any one of the source from top of the grid and reach any one of the destination to bottom of the grid in minimum possible path sum. But you have only four directions(right,right+down,down,left+down) to move from current location to any other location.
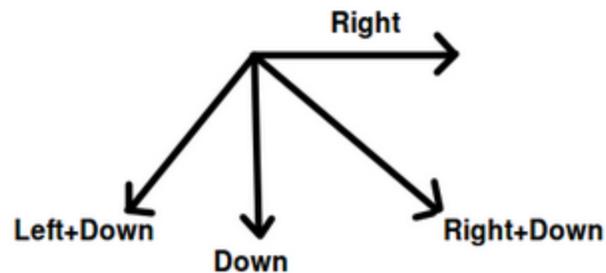
Grid contains either positive or negative integer values. Output should be minimum possible path sum from source to destination.

Input

- The first line of the input contains an integer T denoting the number of test cases. The description of T test cases follows.
- The first line of each test case contains two integers N and M denoting number of rows and columns of 2D grid
- Next N lines contains M space separated +ve/-ve integers denoting the path cost

Output

For each test case, output a single line containing minimum possible path sum.

Constraints

- $1 \le T \le 15$
- $1 \le N \le 1000$
- $1 \le M \le 1000$
- $-100000 <= Grid[i][j] <= 100000$

Subtasks

Subtask 1: (20 points)
- $1 \le N,M \le 20$
- $1 \le T \le 5$

Subtask 2: (30 points)
- $1 \le N,M \le 50$
- $1 \le T \le 10$

Subtask 3: (50 points)
- Original constraints

Example

Input:
1
3 3
1 -1 2
1 2 2
1 -1 -1

Output:
-2

Explanation

Example case 1. Chosen minimum sum path in 2d grid is
Minimum path sum = Grid[0][1]+Grid[1][0]+Grid[2][1]+Grid[2][2]
Minimum path sum = (-1)+(1)+(-1)+(-1)=-2